1. Course number and name: BMED 3310 Biotransport
2. Credits and contact hours: (2-2-0-3)
3. Prepared by: Ross Ethier and Cristi Bell-Huff
4. Textbook: Fundamentals of Momentum, Heat, and Mass Transfer, Welty, Wicks, Wilson and Rorrer, 5th edition, John Wiley&Sons, Inc., (2008)
5. Specific course information
    a. Catalog description: Fundamental principles of fluid, heat, and mass transfer with particular emphasis on physiological and biomedical systems.
    b. Prerequisites or co-requisites: CS 1371, PHYS 2211, BMED 2110, MATH 2551 and MATH 2552
    c. Required
6. Specific goals for the course
    a. Identify, formulate, and solve biomedical problems involving mass, momentum and/or heat transfer (Student Outcome 1)
        i. Formulate differential equations that represent the physical situation of biomedical problems involving mass, momentum and/or heat transfer (or combinations thereof) and determine appropriate boundary conditions
        ii. Apply conservation laws of fluid flow to describe the system (pressure drops, velocities, velocity profiles, shear stresses, shear rates) for various geometries, particularly for flow through conduits
        iii. Apply differential mass or heat balances to determine concentrations or temperatures at a particular point or concentration/temperature profiles with and without biochemical reactions, and to determine mass/heat fluxes, respectively
    b. Explain analogies between heat and mass transfer, and employ them to solve biomedical engineering problems (Student Outcomes 1)
        i. Distinguish between modes of heat or mass transfer, explain analogies between heat and mass transfer, and apply the correct equations to describe each mode
        ii. Determine convective mass/heat transfer coefficients using appropriate analogies for the geometric situation
7. Brief list of topics to be covered:
    a. Molecular mass transfer, differential equations of mass transfer, convective mass transfer
    b. Fluid mechanics, principles of fluid flow
    c. Heat transfer, differential equations of heat transfer, convective heat transfer, heat
    d. exchangers
    e. Transient heat transfer